DOCUMENT RESUME

ED 088 805 SP 007 721

TITLE	A Program for the National Institute of Education (A Report of the PSAC Panel on Educational R&D).
INSTITUTION	President's Science Advisory Commission, Washington, D. C. Panel on Educational Research and Development.
PUB DATE	30 Dec 72
NOTE	27p.
EDRS PRICE	MF-$0.75 HC-$1.85
DESCRIPTORS	*Educational Development; *Educational Improvement; Educational Objectives; Educational Opportunities; Evaluation Techniques; Experimental Schools; *Government Role; Individual Needs; *Student Needs
IDENTIFIERS	*National Institute of Education; NIE; NIE Archives

ABSTRACT

This document, a 1970 report from the President's Science Advisory Council's Panel on Education Research and Development, presents suggestions concerning ways of organizing the program of the newly founded National Institute of Education (NIE). This report is concerned only with the organization of the research and development program itself. The suggestions are organized into three divisions. These divisions, with some of the points discussed in each, are as follows: a) Improving Educational Opportunity for the Individual Student--use of language, learning and curriculum development, social interactions as they relate to the individual student, aid to deprived children, opportunities for the gifted, education of school staff; b) Improving the Social Organization of Learning--competitive schools, experimental schools; and c) Educational Goals, Standards and Evaluation--evaluation of "natural" experiments, evaluation of long-term objectives of schools, evaluation of broad standards of student development, investigation of the effects of tests on education, the national assessment, and dissemination. An appendix includes a comparison between the suggestions of this report and the proposal for NIE of Roger E. Levien. (JA)

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A Program for the National Institute of Education (A Report of the PSAC Panel on Educational R&D) PSAC, December 30, 1972.

SP 007 321

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ED 088805

A Program for the National Institute of Education

(A Report of the PSAC Panel on Educational R & D)

Introduction

In his message on Educational Reform last March, President Nixon proposed that the nation establish a National Institute of Education to "conduct basic and applied educational research" both within the Institute and by contract with universities and other organizations. The PSAC Panel on Educational R and D is enthusiastic about the potential of such an Institute and has sponsored and participated in intragovernmental discussions of its possible modes of organization and functioning. This paper reports our suggestions concerning one of the ways of organizing its program.

A National Institute of Education could easily affect a major strengthening of research and development related to education and thereby substantially improve learning throughout the U.S. Much productive thought has already gone into designs for the Institute. In particular, Dr. Roger Levien, who directs a Rand study under contract with the Department of HEW, is developing a plan for the NIE. We have had the privilege of reading his preliminary draft of October 30, and believe that his report when issued will constitute a major contribution to the Institute's future success. We are very favorably impressed by the wide range of persons, from many disciplines and from the schools themselves, who were involved in the preparation of this report and trust that this wide

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participation will carry over into later phases of planning and most important, into the actual programs of the NIE. Nevertheless, we hope that it will prove useful to have our Panel present its views; where they are concordant with Dr. Levien's, they may serve to strengthen his, and where they diverge, they may provide worthwhile alternatives.

Dr. Levien's report is properly concerned not only with program but with the organization, staffing and financing of the Institute, and with the best ways of recruiting "the permanent staff of outstanding scholars" that the President called for. These are important questions. The PSAC Panel has, however, restricted its present report to a narrower field: the organization of the research and development program itself. Although we are in agreement with much of what Dr. Levien offers, our research program differs significantly from his; a brief analysis of the similarities and differences in the research programs is offered in Appendix II to this report. Since we are deeply concerned that the National Institute of Education be a success, we hope that the Panel's views will prove useful; we would like to avoid the possibility, however remote, that the NIE could become, or be criticized as merely a dressed up version of the Office of Education Bureau of Research or NCERD, with more money but without greater effectiveness. Decisions as to program will finally have to be made by the Commissioner of Education, by the Secretary of HEW, by the first Director when he is chosen, and of course by the Congress when it acts upon the President's suggestions for legislation. We hope that our suggestions for a research program will help those planning the NIE to create an organization whose effective output will be

commensurate with the large resources it will command.

Our suggestions are organized in three (somewhat overlapping) divisions:

A. Improving educational opportunity for the individual student,

B. Improving the social organization of learning

C. Educational goals, standards and evaluation.

Little attention is given in this paper to the question of the division of effort, as between in-house and extramural activities. As a general proposition, however, we feel that a research and development group devoted to Goals, Standards and Evaluation should be part of the NIE itself. In order to investigate new methods of evaluation, the NIE will need to establish a close relationship with several school systems that are interested in cooperating in various experiments. In addition to providing a testing ground for the methods of evaluation, these cooperating school systems would serve an additional purpose. One of the attractive features of the NIE to leading scholars could be its close connections with schools where experiments can be carried out; further the results of previous experiments would be available at NIE for analysis. By contrast, the majority of the program devoted to improving individual learning would presumably be handled by contract with universities and other organizations. The NIE would nevertheless need to house some first-class investigators in these fields, in order to maintain the competence required to administer a quality program elsewhere.

A. Improving educational quality for the student

1. Use of language

a. Oral communication. Recent studies have shown that the disadvantaged frequently begin school seriously handicapped with respect to their

ability to use standard English, and to grasp the concepts behind important words, such as the prepositions (over, under, after, before, on, behind, etc.). Programs such as "Sesame Street" and those in several effective preschools are aimed at improving oral communication; much research and development are needed in this area, both at the preschool level and later. Such research could be sponsored by the NIE extra-mural program, in cooperation with the program of the Office of Child Development and the NICHD.

b. Relationship between command of spoken language and reading. Reading may be regarded as a decoding process. Thus children with an inadequate vocabulary may be severely handicapped, since a word may be pronounced correctly but unrecognized. A variation now occasionally practiced is to record stories told by children, type them, and allow each child to learn his own words, where the vocabulary, even if not in standard English, is familiar to him. Investigation may show that, for some retarded readers, the quickest and best path to reading skill will come with postponing reading, and teaching standard spoken English first.

c. Reading. Although much attention has been devoted to reading, only recently have scientific studies of perception been related to reading; much fundamental research in this vitally important field could profitably be sponsored by the NIE.

d. Writing. How should children be taught to write? Should one encourage composition, with someone else (teacher, teacher's aid, older students) doing the actual mechanical writing, perhaps with a typewriter, both to encourage composition and to supply texts for reading. Relatively little investigation has been centered on this vital area.

2. Learning and Curriculum Development

a. Fundamental investigations of perception and memory. When, someday we discover the biochemical processes of memory and thought, we may be able to revolutionize teaching and learning. The current tentative conclusion is that we have at least two sorts of memory, a short term memory (half-hour or less); a permanent one; if this tantalizing concept is correct, we need to find what triggers the transposition from short to long-term memory, and what interferes. Few areas can offer such enormous potential pay-off. The NIE should cooperate with the National Institute of Mental Health in this area.

b. New methodology. A number of new methods of teaching and learning are today under investigation; one example is individually prescribed instruction. Methods similar to this have been in and out of the schools for a generation or more; we need to find whether it is effective, or more probably where and for whom it is effective, what are its limitations.

c. Use of teaching aids. Modern technology offers many teaching aids. TV has been used effectively in "Sesame Street" and in the school system of Samoa. Computer-assisted instruction is under investigation in several laboratories; it may prove a magnificent aid for problem-solving, and problem-solving

examinations, and affect the quality of education by encouraging emphasis on problem solving in schools. Its revolutionary potential cannot be achieved without both improvements in hardware, to reduce costs drastically, and experiments with soft-ware, to find where CAI is and where it is not effective.

d. Classroom materials and artifacts. The use of many artifacts to interest children in learning constitutes a major feature of some of the British infant schools in Leicestershire and elsewhere; for convenience, the method will be called the "Leicestershire" system. The fish and birds, typewriters and adding machines, puzzles, toys, pictures and books, tools, relief maps, paints and clay make the school rooms vital and interesting. We need investigations of the value of such artifacts in teaching. At the present time, only a minute fraction (e.g. 3%) of school budgets are devoted to such artifacts. A small increase in the student/teacher ratio would supply the money for a major increase in artifacts, might simultaneously make teaching easier (despite more students per teacher) and improve education. An investigation of the optimum balance between personnel and instruments is needed.

e. Curriculum development. Finally, the content of teaching is vitally important. Love and attention by devoted teachers, and mechanical devices such as films and TV, are primarily means to communicate content; the content must be well chosen. The curriculum revision in the sciences (PSSC Physics, Project Physics, the Chemical Bond Approach, and Chem Study in chemistry, three new biology texts) points the way, but are themselves simply the early models of interesting curricula. Much remains to be done to improve these

first attempts, and of course much needs to be done to initiate curriculum reform in English, social studies, history, art and music, etc. The NIE could contract for these curricula, in collaboration with the National Science Foundation and the National Foundation on the Arts and the Humanities.

3. Social Interactions, as they Relate to the Individual Student.

The study of social interactions takes place at two levels. On one level, it is concerned with social organization (see Part B); at another level, social interactions affect learning by the individual student.

a. Study of human awareness. We as a nation are concerned not only that students gain factual knowledge of the world, and acquire problem-solving abilities with respect to such knowledge, but that they become aware of others, and able to interact successfully with their peers and with adults. Much research and development needs to be done in the area of human interactions.

b. Effect of peers on learning. The extent to which children learn from their peers is substantial; the attitudes of peers has been shown to provide important motivation to learning. As an example, consider the effect of peers on language development; a young child in a foreign country (or a different region of his own country) quickly acquires a "perfect" accent. This influence needs to be analyzed and used constructively.

c. Effect of home environment on learning. Studies suggest that the influence of home environment on learning is more important than that of the school. Yet most attention is directed toward schools. We need to know more

about the crucial elements of the home environment.

4. Aid to Deprived Children

a. Physical handicaps. The nation needs to diagnose promptly the handicaps of children (poor vision, hearing, malnutrition), and arrange for remedial action.

b. Environmental handicaps. The nation similarly needs to diagnose environmental handicaps of children promptly, and arrange for remedial action (see below). Such environmental handicaps can, for example, include inadequate preschool education. We need to invent and test new and imaginative programs to prevent such preschool handicaps. One such program, suggested by this panel, is being implemented now by the Office of Child Development. Curriculum materials in child development and learning are being developed for adolescents. When they become parents a few years hence, they will know something about teaching their children to talk, and will know how important to child development early teaching and learning can be.

c. Remedial programs. We need research and development on remedial programs designed to help disadvantaged children catch up to their more fortunate contemporaries, and investigation of the needed motivation so that they will wish to do so.

5. Opportunities for the Gifted

The nation must care not only for its disadvantaged and handicapped, but also for its specially gifted children. As Terman said, "It should go without saying that a nation's resources of intellectual talent are among the most precious it will ever have . . ." The nation will depend, for its economic, technological,

artistic and political future both on the general vigor of its population and on the special contribution of genius. The welfare, safety and happiness of all of us depend on the inventions, discoveries and accomplishments of our future Langmuirs and Edisons, Mark Twains and Fords. A program that stimulates our most talented children constitutes a small but vital part of a balanced educational program.

6. Education of School Staff

a. Teacher education is central to development of better schools. Much can be done to improve it, including curriculum development for new, modern courses in psychology and other subjects.

Furthermore, teachers need acquaintance with some examples of successful educational R&D, so that they will be more receptive to new programs, and will realize that new programs must generally be adapted as well as adopted in the schools.

b. Administrators and specialists need training for their jobs; coming up through the ranks is helpful but insufficient. In particular, school administrators need to discuss and become acquainted with the possibilities for improving schools that are offered by community participation. They must see the community as a source of ideas, help and support, of cooperation and benefit. For surely community participation in schools will grow rapidly, and the attitudes of administrators must be tuned to take advantage of, and not fight against, this development.

Another major new question for school administration, concerns the rights and responsibilities of students and parents. (This, of course, is closely related to questions of community participation.) We have in the past given little consideration to these rights, but have regarded children as individuals to be educated and molded by the school system more or less as the teachers and administrators thought best. The NIE could profitably take the lead in consideration of these problems.

B. Improving the Social Organization of Learning

The present school system assigns one school to a given district, and allows the parent or student no effective choice, except for a rare few students who can afford private schools. Despite local control of schools, public schools throughout the nation are remarkably similar. Perhaps the College Board and similar examinations are in part responsible for this uniformity. In any event, some variation in school experience may be essential to improving the organization of education in the U.S. Such variation may take two forms: experimental schools (which can serve as models if successful) where new ways of organizing learning can be tried, and provision within a school system for choice among styles of education by students and parents. The latter idea is based on two premises. First, that children differ, so that no one style can possibly be best for all, and second that every school may be improved by competition with others.

1. Competitive Schools

a. Voucher system. The Office of Economic Opportunity plans to try an experiment with educational vouchers in a major city. This system grants vouchers to parents for their children, vouchers that are valid for a specified

payment for schooling. This allows schools to be established by any responsible group, and these schools then compete for students. The system has obvious advantages, and obvious dangers. If supplementary payments may be made by parents then the best financed schools will be those where the children of the prosperous go, and schools might tend to become more segregated on income lines than at present. Nevertheless, the system can probably be arranged so as to avoid this pitfall, and provide competition and variety among schools, to the benefit of the students.

b. Choice of school type within the system. In populous school districts, where two or more schools are within reasonable walking or busing distance of homes in the community, schools could be established that deliberately used different systems. For example, one school might be traditional, and another much more open (see the "Leicestershire" model, below). This should benefit the children in the district, since different children will benefit from different types of schooling, or the same child may benefit from different systems in different years. Further, the system could generate competition for excellence.

c. Choice of school for a particular activity. Another possible method of improving schools, related to choice of school type, is choice of school for a particular activity. Certain schools could specialize in specific activities (shop work, sculpture, swimming, calculus) and students might have the right to attend the appropriate school for an activity of his choice.

d. Accountability Schools. Schools that are accountable for their results to the community they serve would provide incentive to the staff for improved performance. If the salaries of the teachers and administrators were linked to the performance of the students, the motivation of the staff would be assured; teachers could not excuse poor performance of their pupils by saying the students are stupid, since unless the students learned well, the teachers would not be paid well. Of course, the community would have to insist on testing more than simple performance in school subjects, or teachers might become martinets; attitudes of the students toward school would also be important. But an attempt to develop a system for accountability in schools that incorporates the potential advantages and avoid the potential dangers is well worth the attention of the NIE.

2. New Educational Organization (Experimental "schools").

a. "Leicestershire" model. This style of education, developed over the past two decades in British infant schools (and sometimes called the Leicestershire system) features considerable freedom on the part of the school staff to arrange the curriculum, considerable freedom on the part of each individual student to carry out activities of his choice on his own time schedule, and considerable reliance on a wealth of toys, books, machines, puzzles, live animals, etc., to stimulate interest on the part of the students. The teacher/student ratio is often an astounding 40-45, despite individualization of instruction. It isn't clear how easily this model can be imported; freedom for the child without chaos is probably linked to the self-discipline British children learn in the home. The model is nevertheless an important one for investigation.

b. Tutoring by older children. An experiment in U.S. schools has shown that tutoring of younger children by older ones resulted in slightly improved learning for the younger children, and dramatic intellectual gains for the older children who were tutoring. A school based on this principle is well worth examining, and might link much improved learning with social gains, as older children find an important role for themselves in society. Such schools might also operate at lower cost, especially if the expected improvement in spirit on the part of the older children diminishes the problem of the "breakdown of the social fabric" in schools.

c. Individually Prescribed Instruction. One of the important innovations under investigation with support from the Office of Education is Individually Prescribed Instruction (IPI). The present research and development are largely devoted to teaching mathematics. That field is broken down into a matrix, and students tested to see what parts of the matrix they know, and what lacunae in their knowledge exist. Then each student works by himself at his own pace on the lessons appropriate to him. This form of instruction has obvious advantages, and some less obvious disadvantages, such as the loss of group interaction and peer influence on learning. The system warrants intensive R&D, and since the work was started by OE, should be continued by the NIE.

d. Work-Study Schools. Why should children remain in school until they graduate at the age of 18 (or from college at 22), and only then go to work?

Why not work and school interspersed, as at Antioch College, or work and school side by side, as with many part-time and night-school students? Work can improve schooling, by showing the relevance of much school material, especially in English, mathematics and science. (Although one would not wish to restrict learning to just the immediately relevant, motivation to learn is vitally important.) Furthermore, a work-study program may inculcate the habit of lifelong learning. Some work-study schools have been started; they merit support, evaluation, and further development.

e. Schools based on community participation. Community participation in the schools, until recently, was generally minimal. Today intense community participation ranges from parent advice on appointments and curriculum through direct parental participation in every school activity. Community involvement in the schools should result in better education, but in time some patterns will almost certainly emerge as superior to others. Experiment with and evaluation of community participation should be enormously valuable, and precisely suitable for the NIE.

f. Learning Outside of the Classroom. Most of what most of us learn is acquired outside of the classroom. In particular, the vitally important learning in early childhood is done at home. Young students have much to learn from factories, farms, construction work, from art and science museums, from libraries, from law courts, from movies, theaters, airports, etc. Much learning comes from participation in organized sports and from work experience (as suggested in the idea of Work-Study schools, above). Learning today may

come in large measure from TV, and large programs could be mounted for TV at home. Why should school be five days a week, or for the hours now prescribed? We might need fewer buildings and perhaps fewer teachers if part of the program were for learning at home, and in the educational opportunities inherent in the surroundings in cities and in the countryside. Experiments based on these possibilities ought to be more widespread.

Another supplement to school should be travel. It's difficult to evaluate the intellectual benefits of travel, but we know they are enormous; families who can afford it have given their children these benefits for generations. We are foolish to ignore an important education method because we don't yet know how to test or measure its results. Americans are great travellers; more effort is needed in finding out how to maximize the educational value of this travel, and how to evaluate it.

g. Other educational opportunities. The present legal requirements for school attendance to a given age (rather than to a given criterion of accomplishment) makes little educational sense. The requirement is probably in part an attempt to use the schools for custodial care of children while they are carefully kept off the job market. A more vigorous economy, where job opportunities exceed the labor supply, would presumably lead to a different pattern. So far as education is concerned, one might well remove the legal requirement for school for students over fourteen who pass specified series of tests. Such students would be free to seek work, or of course to remain in school. The benefits to the individual and the school system of substituting examinations for

age as a criterion to leave school might be great. Many who now regard school as a form of jail sentence, to be served for a specific length of time, might have an incentive to learn so as to leave; many disruptive students who hate school would be out of it, and might enjoy facing the real challenges of industry; many who passed the test would voluntarily remain, but with improved motivation. Such an experimental school is worth trying.

Closely linked to this idea is that of the "free school", where students come and go as and when they wish. Such schools are now operated for drop-outs; they might be extended to others, and must certainly be evaluated.

C. Educational Goals, Standards, and Evaluation.

1. Evaluation of "Natural" Experiments

A number of important "natural" experiments are conducted from time to time in education. The National Institute of Education should take the lead in seeing that these experiments are properly evaluated. An example of an opportunity missed involves the Head Start program. Here was a major experiment, yet no criteria of success were determined prior to setting up the schools, no control group was set aside for later comparison, and when the Westinghouse Learning Corp. began its evaluation, most of the needed data and controls were not only missing but forever unavailable. Another opportunity is now at hand with respect to school desegregation. Despite the years that have elapsed since the Supreme Court decision on desegregation, little had been accomplished in the deep South until this year. Now many schools are desegregating, and the effect of this major social change on learning, on community

attitudes, and on school structure should be evaluated. When and if government supported child-care centers are activated, under the President's Family Assistance plan or otherwise, the nation ought to evaluate the results.

Another "natural" experiment is provided by the phenomenal apparent success of "Sesame Street". Millions of children watched this program. We shall wish to know whether the children who watched are more successful in school than similar children who did not watch, and in particular whether the level of performance of disadvantaged children (who might otherwise not get the information transmitted by the program) is substantially improved. And this evaluation would best be made by an independent and unprejudiced organization such as the NIE.

Over the years, many opportunities will arise to evaluate "natural" experiments in education. No planned experiments can ever have the scope of these natural ones: some governmental agency, and presumably the NIE, ought to have responsibility for this evaluation.

2. Examination of the Long-Term Objectives of Schools

Very little attention has been given to an examination of the objectives of education. Various parents and students will have differing objectives, and no single educational system can hope to satisfy all objectives, or satisfy all parents equally. In particular, different communities will offer differing value judgements concerning the objectives of education, and these various and varying ideas should be brought into the open for discussion. The present objectives of

schools include education for choosing and performing jobs, education for general cultural pleasure, education for citizenship, education to aid each individual to adapt to changing times, and, undoubtedly, custodial care of children to keep them off the streets and out of the job market. The NIE could evaluate school programs in terms of the long-term objectives of the schools.

3. Evolution of Broad Standards of Student Development

In connection with the development of long-term objectives, new methods of evaluation are urgently needed. At the present time, most evaluation in schools is devoted to those things that can readily be quantified, such as mathematics and spelling scores, and the recitation of facts in history. Modern tests can be conducted to measure attitudes, and are of increasing validity as the community of testers gets more and more experience. But very little testing is devoted to questions of citizenship or honesty or friendliness, or even of enjoyment at school; as earlier noted, no-one has devised a way to evaluate the educational value of travel. Within traditional school subjects, testing tends to emphasize memory over understanding (for a possible cure, see below under computer-assisted examinations). The National Institute of Education is the natural locus for an advanced group who can devote more sophisticated means of evaluation.

4. Investigation of the Effects of Tests on Education

Certain tests may have an important influence on education. Teachers, who are judged in part by how well their students perform on standard tests, may well teach to those tests. The Iowa, the N. Y. Regents, and College Board tests may all do much more than measure; they may, in effect, decide what is taught, and how. Perhaps it is the Educational Testing Service, and not the State of local school boards, that in reality fixes school curricula. A group concerned with evaluation will want to know, first of all, the extent to which tests control education.

An attempt could be made to devise tests that accord with the educational objectives of a community. In particular, if problem-solving is considered an important activity for students, then an experiment might be tried with problem-solving examinations. Teachers might prepare their students for such examinations by increasing emphasis on problem-solving in school. Another important and understressed student activity is that of finding, or setting problems.

One way to introduce problem-solving would utilize computer aided examinations. Computer-aided instruction may be too expensive for immediate use, but we could undoubtedly afford at least computer-assisted college board examinations. These examinations would permit "chain" problems, where the answer to the first part is used in the second, and so on. At present, such problems are rarely tried, for if a student misses the first part, he cannot solve any of the problem, even if he understands all the rest. As a result, even

when problems are introduced on examinations (and perhaps in school), they tend to be extremely simple ones, quite unlike the real problems that face scientists and citizens. A computer, however, could record that the student had missed the first section of a multistep problem, supply him with the answer to it, and let him move forward. A computer-assisted examination can rival an oral one, but at relatively minor cost, and with complete reproducibility from one student to the next. The NIE could cooperate with the NSF to devise and evaluate such experimental examinations.

5. The National Assessment

The National Assessment, which should be completed for the first time this year, will presumably provide, like the census, a decennial indication of our nation's educational position, and provide the information needed by educators and local boards in deciding policy. The Assessment has been and should remain a function of the Education Commission of the States, but might well obtain support from the National Institute of Education.

6. Dissemination

The dissemination of the results of educational research and development is a major responsibility of the Office of Education, and will presumably be carried out through the NIE. Considerable controversy surrounds problems of dissemination. Some advocates feel that sufficient knowledge of educational methods is now available so that, if these methods were properly disseminated, considerable progress could be made immediately in reforming the schools.

Others believe that the difficulty really lies with evaluation. They maintain that we have seldom if ever been able to prove that any given innovation is really much better than the practices it replaces, but when and if any method is firmly proven, dissemination will prove no problem; the method will sweep the schools, just as penicillin swept through the medical profession once its efficacy was established. Since sincere and informed men hold both these views, probably both are partly correct.

The National Institute of Education can aid in the problem by careful evaluation, by pointing out, with respect to each evaluation just what was tested, what question was asked and how firm the answer is, or is not. Until the results of experiments in education are as firm as the results of experiments in physics or chemistry, the problems of dissemination will be difficult, and inextrically linked to those of evaluation. Honesty and care in reporting, and imaginative and thorough evaluation by the NIE can be an important boost to dissemination.

APPENDIX I

Members of the Panel on Educational Research and Development Concerned with this Report

Robert Cross, President, Swarthmore College

James Coleman, Sociology, the Johns Hopkins University

James Comer, M.D., Psychiatry, Yale University

John Davis, Superintendent of Schools, Minneapolis

Jacob Getzels, Education, University of Chicago

Jerome Kagan, Psychology, Harvard University

George Miller,* Psychology, Rockefeller University

Colin MacLeod, M.D., Pathology, New York University

Herbert Simon, Psychology, Carnegie-Mellon University

F.H.Westheimer, Chemistry, Harvard University, Chairman

John Mays, OST Staff

*For part of the time

APPENDIX II

Since the Panel's report on "A Program for the National Institute of Education" was written, we have had an opportunity to see the Draft of October 30, by Roger E. Levien, entitled "National Institute of Education- Preliminary Plan for the Proposed Institute". As Panel Chairman, I have here summarized the similarities and differences, as I see them, between Dr. Levien's proposal for a R & D program, and ours.

Similarities.

Despite the differences between the way in which we organized our program and the way in which Dr. Levien organized his, the actual content of the programs overlap to a considerable extent: we agree on many of the things that must be done, and where many of the opportunities lie, although obviously we differ or emphasis. For example, both programs make provision for curriculum development, for the use of more technology in education, for special programs directed to the disadvantaged, for experimental schools, and for better evaluation.

Differences.

1. Organization of the programs. The major areas for the organization of the two programs are shown below.

Dr. Levien's Program	PSAC Panel Program
I. Solution of Major Educational Problems	A. Improving Educational Quality for the Individual Student
II. Advancing Educational Practice	B. Improving the Social Organization of Learning

III. Strengthening Education's Foundations — C. Educational Goals, Standards and Evaluation

IV. Strengthening the R & D System

No method of dividing educational R & D can be best for all purposes. The differences in organization implied by the areas shown above are considered below.

2. Duplication. No method of organization of a program for the National Institute of Education is likely to avoid duplication completely, and ours does not do so. Nevertheless, we find that Dr. Levien's program contains major duplications that may increase the difficulty of carrying out the work of the Institute. For example Experimental Schools are introduced in the context of "Improving education of the disadvantaged" and of "Improving the quality of education", of "Improving the Instructional Process" and of "Improving the Educational System". (Subdivisions of areas I and II.) Technology is likely to be useful in many phases of education; it is designated for study in "Improving education of the disadvantaged", "Improving the quality of education", "Improving the instructional process", "Improving educational assessment" and in a section on "Increase ability to use technology and media effectively in education".

Dr. Levien has suggested a "matrix" organization for the Institute, where individuals will be hired by discipline, rather than as members of a team to work on a particular problem. This system of organization, now much used in intramural programs in industry and elsewhere, is here applied to a predominantly extramural program. Its advantages include greater flexibility in mounting new programs

and ending completed or unsuccessful ones and continuing cross fertilization between basic research and work on current problems. This organization may, on the other hand, make it harder to avoid internal conflict and to formulate a coherent program. We believe the question of organization should be kept open and explored further in the next phase of the planning effort.

3. Basic Research. Should basic research be made a separate division of the NIE, as in Dr. Levien's program ("Strengthening Educational Foundations") or should basic research be supported as part of the mission of the separate program managers? Our panel is aware of the past contributions and sanguine as to the future potential of basic research; we want to encourage it. We are inclined to believe that it will thrive best if it is included with applied research and development, rather than treated separately.

4. Emphasis. The two programs lead to quite different emphasis on a number of problems. The most important differences probably concern (a) education for the disadvantaged, and (b) evaluation.

(a) Disadvantaged. The President, in his message on Education Reform, emphasized compensatory education and called on the NIE" . . . to determine what is needed . . . to make our compensatory education effort successful". Dr. Levien's program contains a major subdivision of his area I entitled "Improving Education of the Disadvantaged" while ours contains a section on "Aid to Deprived Children" yet despite these similar responses to the President's message, the emphasis is different. Our Panel believes that the best way to improve the education of the disadvantaged will be to improve the education of all. Our point is perhaps illustrated by "Sesame Street" where recent evaluation suggests that the relative

gains for "disadvantaged" are greater than those for "advantaged" children. Undoubtedly the program was motivated by the desire to help the disadvantaged. But the program is overtly directed toward and in fact promotes the education of all children; it might not be so readily accepted by parents of either group were it specifically labeled as education for the disadvantaged. For this reason we have organized our program so that the major emphasis falls on "improving education for the individual student" and on "improving the social organization of the schools".

(b) Both Dr. Levien's program and ours offer research on evaluation, again in direct response to the President's message. We have however placed greater emphasis on this area by suggesting a separate division on "Educational Goals, Standards, and Evaluation"; this organization contrasts with the several places in Dr. Levien's program among which the responsibility for evaluation is distributed. We believe that our greater emphasis and concentration of effort are needed for the following reasons. First, this area presents many difficult intellectual problems, especially those concerned with broader standards than those used in past evaluations. Second, since we, like Dr. Levien, believe that the NIE should have its intial in-house activity in the area of evaluation, we believe that a major separate division devoted to it is desirable.